DEC STD 033-1 Microfilm Aperture Cards — Requirements

DOCUMENT IDENTIFIER: A-DS-EL00033-01-0000 Rev C2, 16-Sep-1991

ABSTRACT: This section defines the format and quality requirements for microfilm aperture cards containing engineering documentation.

APPLICABILITY: This standard is mandatory for Digital personnel involved in the filming of microfilm aperture cards used within Digital.

STATUS: APPROVED 16-Sep-1991; use VTX SMC for current status.

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APPROVAL: This standard has been recommended for approval by the General Review group for its category. Rev C2 incorporates clerical updates only, with no changes to the technical content.

Gerry Marini - Standard Owner

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Gerry Marini
Use $ VTX ELF for the latest location information.

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1 INTRODUCTION

This section of DEC STD 033 defines the format and quality requirements for microfilm aperture cards. The image location and orientation, aperture card format, and quality requirements for silver and diazo microfilm are covered.

1.1 RESPONSIBILITIES

This section describes the responsibilities of engineering sites and Engineering Information and Image Services in the microfilming process.

1.1.1 Engineering Sites

Any engineering site or a vendor who produces microfilm shall ensure that the finished product conforms to the requirements in this standard.

1.1.2 Engineering Information and Image Services

Engineering Information and Image Services shall be responsible for meeting the requirements of this standard for all microfilm aperture cards they produce. Engineering Information and Image Services reserves the right to reject microfilm from other Digital Engineering sites that do not conform to this standard.

This standard is maintained by Engineering Information and Image Services. For additional information, contact Gerry Marini, NRO, DTN 234-4066.

2 REQUIREMENTS

This section discusses the requirements for microfilming engineering documentation.

2.1 ENGINEERING DOCUMENTATION

Engineering documentation to be microfilmed shall conform to requirements defined in *DEC STD 013-0 Standard Engineering Drawing Formats and Forms*.

Engineering documentation to be microfilmed shall also conform to the linework and lettering quality requirements specified in *DEC STD 182-0 Engineering Documentation Acceptance Criteria*. Magnetic design media shall conform to the microfilm requirements in *DEC STD 185-0 Documentation of Computer Media in the Engineering Documentation System*, and *DEC STD 029-0 Graphic COM System: Requirements and Procedures*.

2.2 FILM

The film used to microfilm engineering documentation shall be 35 mm nonperforated archival film. The film shall be AHU silver halide daylight loading archival type, or a substitute approved by Engineering Information and Image Services. The film must be capable of resolving not less than 200 lines per millimeter. Refer to DEC STD 029-0 for COM (computer output microfilm computable) film requirements.

NOTE

If an Engineering Services Site is sending 35 mm film to Engineering Information and Image Services, then the film must be in roll form. The first frame of each roll must be an NBS (National Bureau of Standards) 1010 Microcopy Resolution Chart.

2.3 FILMING

This section discusses the filming requirements for microfilming engineering documentation.

2.3.1 Reduction Ratio

The reduction of engineering documentation on microfilm shall conform to the ratios specified in Tables 1 and 2.

Table 1: Reduction Ratios for U.S. Standard Sizes

Type	Original Document Size (in inches)	Reduction Ratio
vertical A	8.5 X 11	16X
horizontal A	8.5 X 11	16X
horizontal B	11 X 17	16X
horizontal C	17 X 22	16X
horizontal D	22 X 34	24X
horizontal E	34 X 44	30X
horizontal J[1]	34 X 55	30X

[1]The horizontal dimension for *J* size documents may be in increments of 11 inches, not to exceed 143 inches.

Table 2: Reduction Ratios for Metric Sizes

Type	Original Document Size (in millimeters)	Reduction Ratio
A4	210 x 297	16X
A3	297 x 420	16X
A2	420 x 594	16X
A1	594 x 841	24X
A0	841 x 1189	30X

2.3.2 Copy Board Illumination

The illumination of the copy board shall be adjusted so that a negative of overall even density is obtained. It is recommended that an illumination ratio of 3:4 be maintained between the center of the copy board (on the optical axis of the lens) and the diagonal corners. A 50.8 mm (2 inch) pull-down of film between frames is required.

2.3.3 Image Location

A drawing being microfilmed must be centered on the copy board so that the micro-image will be properly centered in the film frame. Care must also be taken to prevent skewing of the micro-image in the film frame (see subhead 2.5.1 for image orientation). Refer to DEC STD 029-0 for COM requirements.

2.4 PROCESSED FILM QUALITY CONTROL

The following quality control checks shall be made on each batch of processed microfilm. Every frame of microfilm shall be exposed and processed so that every line and character may be transferred to another film or paper at an acceptable level of legibility.

Should any sample batch be rejected, the whole roll must be inspected.

NOTE

Under normal conditions, the second generation negative, diazo duplicate of a microfilm is acceptable for distribution throughout Digital locations. The diazo duplicate, however, must meet the resolution and density requirements defined in ANSI (American National Standards Institute) PH2.19 *Diffuse Transmission Density*.

2.4.1 Resolution Reading

A microfilm frame of the NBS 1010 Microcopy Resolution Chart shall be filmed with each batch of microfilm. The film shall be checked by a microscope set at approximately 40 diameters of enlargement. The smallest pattern of the chart, in which lines can be separated in all directions, shall be selected as indicating the film's resolutions. Multiplying the reduction ratio used for filming the pattern, times the decimal number adjacent to the selected pattern, yields the resolution in lines per millimeter.

The resolution of a microfilm shall be acceptable if the number of lines per millimeter meets or exceeds the appropriate values in Table 3.

Table 3: Minimum Acceptable Resolution Readings

	Reduction Ratios					
	16X		24X		30X	
	Pattern	Lines per mm	Pattern	Lines per mm	Pattern	Lines per mm
First Generation	6.3	100.8	4.5	108.	4.	120
Second Generation	5.6	89.6	4.0	96.	3.6	108
Third Generation	5.0	80.	3.6	86.4	3.2	96

COM Resolution

Resolution on film should exceed 90 line pairs per millimeter for source documentation microforms. COM should exceed 75 line pairs/mm.

2.4.2 Density Readings

A densitometer meeting the requirements of ANSI Standard PH2.19 (ISO-R5) shall be used to conduct this check. The instrument shall be calibrated using a preset test strip prior to each set of readings. Random samples of microfilm shall be examined for background density and transmission density in the unexposed image area.

Acceptable background density (dark area) of exposed microfilm shall be between 1.0 and 1.2.

Maximum transmission density in the unexposed image area (light area) shall not exceed 0.12.

COM Density

Density of full-reversal processed Computer Output Microforms shall be read in accordance with ANSI PH2.19. Minimum background density shall be 1.8. Maximum background density shall be 2.0. Maximum base density shall be 0.4.

2.4.3 Residual Hypo Test

The residual hypo test, specified in ANSI PH4.8 *Determining The Thiosulfate Content Of Processed Black And White Photographic Film* shall be made. The thiosulfate content of the processed silver-gelatin film shall not exceed one microgram per square centimeter. If one or more samples fail to pass this test, the batch lot shall be rejected.

2.4.4 Visual Inspection

The processed silver film shall be visually inspected, checked for major and minor defects.

Film with major defects must be rejected.

Film having minor defects may be accepted, but indicates the need for a review of the processing system.

The following are major defects (cause for rejection).

- Unclear drawing or document number
- Illegible characters or symbols (filled in or light)
- Illegible lines (discontinuous or light)
- Information that is obscured, illegible, or out of focus
- Blisters, tears, or processing stains on the microfilm
- Scratches on the microfilm that touch or go through the image area
- Foreign material that obliterates, obscures or defaces the image area

The following are minor defects (may be accepted - indicate need for processing system review).

- Foreign material in document image area adversely affecting appearance of frame but not obscuring image.
- Scratches, streaks, bubbles, or lap marks not obscuring image area.

2.5 APERTURE CARDS

The following requirements apply to the image orientation and placement, format, and data fields of microfilm aperture cards.

2.5.1 Image Orientation and Placement

All documents shall be filmed and mounted so that when the aperture card is held upright, with the long dimension horizontal and the aperture at the right, the document image is right reading and, whenever possible, upright. If the image is not upright on the aperture card, it shall be viewed upright when the card is rotated 90° clockwise.

Where multiple images, or sheets of the same document are filmed in the same frame, the arrangement shall conform to either Figure 1 or Figure 2.

Figure 1: Image Placement, Example 1

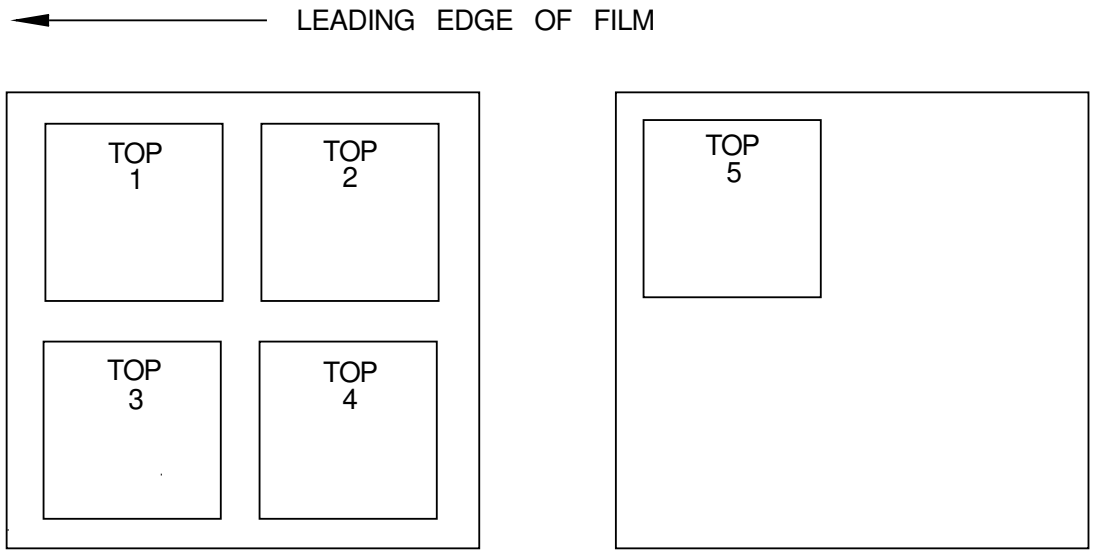
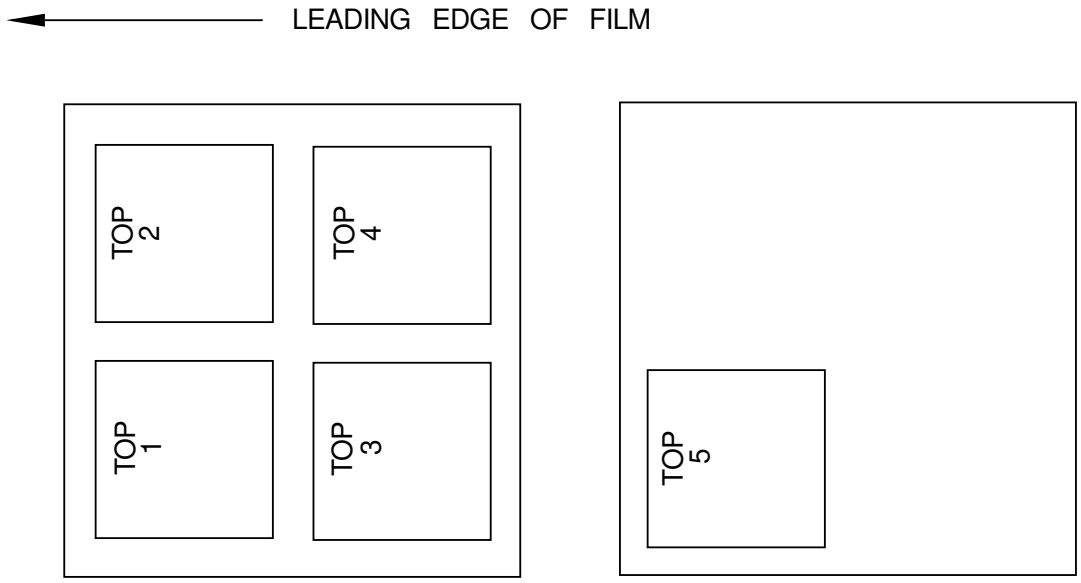


Figure 2: Image Placement, Example 2



2.5.2 Aperture Card Format

Aperture Card format shall conform to ANSI X3.11, *General Purpose Paper Cards for Information Processing*. See Figures 3 and 4.

Figure 3: Sample Tabulating Card

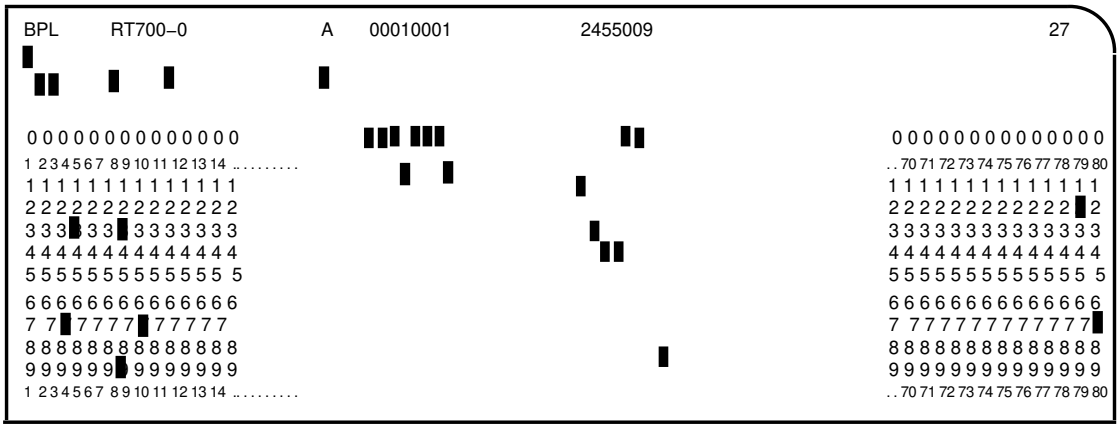
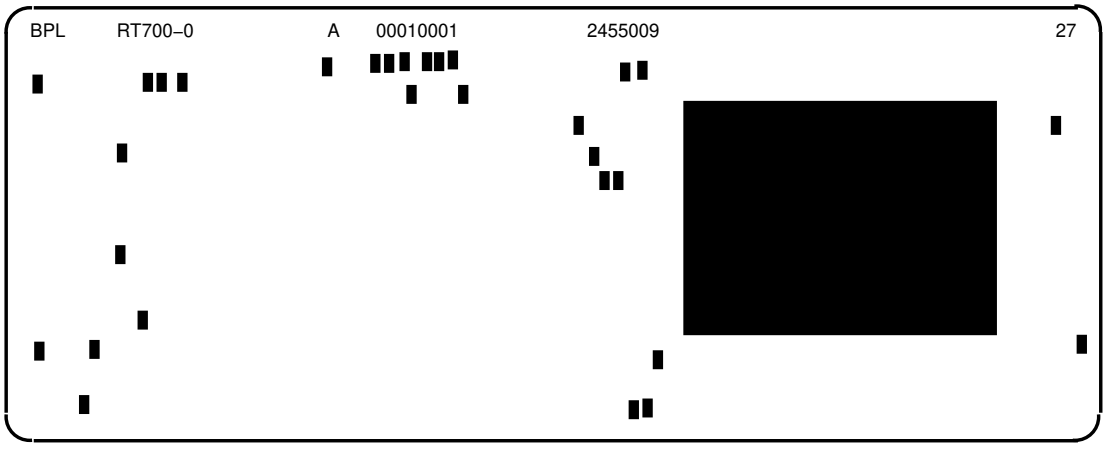


Figure 4: Sample Aperture card



2.5.3 Aperture Card Data Fields

Data shall be punched in Hollerith code and interpreted according to the field descriptions in Table 4.

Table 4: Aperture Card Data Field Descriptions

Column	Field Description
1	Closed field
2	Size
3, 4	Mnemonic code
5 - 7	Closed fields
8 - 25	Document number
26 - 28	Revision
29 - 36	Sheet number and page count
37 - 42	Etch revision (if applicable)
43, 44	Closed fields
45 - 48	Roll number
49	Closed field
50 - 52	Frame number
53 - 77	Closed fields (These fields are reserved for mounting a frame of microfilm.)
78	Closed field
79, 80	Open field (Used by Micrographic Services for quantity to be duplicated.)

APPENDIX A REFERENCED DOCUMENTS

A.1 EL-Class Digital Documents

EL-Class Number	Document Title
EL-00013-00	*DEC STD 013-0 Standard Engineering Drawing Formats and Forms*
EL-00029-00	*DEC STD 029-0 Graphic COM System: Requirements and Procedures*
EL-00182-00	*DEC STD 182-0 Engineering Documentation Acceptance Criteria*
EL-00185-00	*DEC STD 185-0 Documentation of Computer Media in the Engineering Documentation System*

Use VTX SMC to order copies of EL-class documents from Standards and Methods Control. Send distribution questions to JOKUR::SMC or call DTN: 234-4423.

A.2 Other Documents

Document Number	Document Title
ANSI PH2.19	*Diffuse Transmission Density*
ANSI PH4.8	*Determining the Thiosulfate Content of Processed Black and White Photographic Film*
ANSI X3.11	*General Purpose Paper Cards for Information Processing*
NBS 1010	*Microcopy Resolution Chart*

A.3 Ordering Information

Following are the sources for documents not available from Standards and Methods Control.

- ANSI Documents:
  American National Standards Institute (ANSI),
  1430 Broadway, New York, NY 10018,
  Telephone (212) 354-3300 x479
- NBS 1010:
  U.S. Department of Commerce
  U.S. National Bureau of Standards
  Washington, DC 20234

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